
Acoustic Monitor Field Unit

User Guide



Acoustic Monitor Field Unit Model WI-AM

Versions 1.70 or later



Important Information to the User



- Changes or modifications not expressly approved by Adaptive Wireless Solutions may void the user's authority to operate the equipment.
- This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: 1) this device may not cause harmful interference, and 2) this device must accept any interference received, including interference that may cause undesired operation.
- This device is for mobile and fixed use only (not portable or body-worn). A separation distance of 20cm must be maintained at all times between the antenna and the body of the user and bodies of nearby persons.
- This device has been designed to operate with an antenna having a maximum gain of 9 dBd. Antenna having a higher gain is strictly prohibited per regulations of Industry Canada. The required antenna impedance is 50 ohms.
- To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.
- The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's website www.hc-sc.gc.ca/rpb.



FCC Certification



- This product is a frequency hopping RF transceiver module for the 900MHz ISM band, designed to meet FCC 15.247, and is used in industrial control and monitoring applications.
- The antenna is factory installed and **MUST NOT** be removed or modified by the user.

Adaptive Wireless Solutions reserves the right to update or change this user guide at anytime. For the most recent version of the user guide, please check our website: www.adaptive-wireless.com

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Adaptive Wireless Solutions

577 Main Street • Hudson, MA 01749 USA

Phone: (978) 875 - 6000

www.adaptive-wireless.com

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Introduction

1.1: USING THIS MANUAL

This manual is designed to assist in installing, operating, and maintaining AWS Model WI-AM Acoustic Monitor Field Units. The manual is broken into the following sections:

Section 2: Quick Start

This section summarizes what must be done in order to get the device installed, configured, and operating quickly. However, it does not provide detailed or how-to information to perform the tasks outlined.

Section 3: Installation

This section explains mechanical installation considerations, such as Field Unit placement and Field Unit Mounting.

Section 4: General Configuration

In this section, general configuration options including, password protection and selecting a user password are discussed. Also covered, is the setting of a Field Unit tag name, resetting of all Field Unit settings, and a discussion of the various messages that are displayed on the Field Unit LCD.

Section 5: Configuring the RF Communications

This section covers the setup of the Field Unit RF Communications which allow the Field Unit to achieve communication with the Base Radio. Parameters discussed are the Field Unit RF ID, the RF channel setting, and Baud Rate.

Section 6: Configuring the Sampling and Transmission Rates

This section aids the user in selecting the amount of time between each sample of the process, and the time between each transmission of this sample to the Base Radio. Also discussed is the use of setting an abnormal threshold in which sampling and transmission times may change during a period when the process variable is within the abnormal region.

Section 7: Maintaining the Field Unit

This section explains how to care for the Field Unit once it has been placed into service and how to change the battery.

Section 8: Technical Specifications

This section explains the technical specifications that are associated with this device such as power characteristics, accuracy, and operating characteristics.

1.2: ABOUT THE DEVICE

The AWS Acoustic Monitor Field Unit is a reliable Radio Frequency (RF) transceiver coupled with an ultrasound sensor that can be used to monitor a variety of processes in hazardous and hard-to-reach areas. The time and expense of running wires often makes it difficult to measure parameters that have an economic impact on your plant operation, but the Acoustic Monitor Field Unit allows you to quickly and accurately monitor those devices at a fraction of the cost, which gives you bigger and faster returns on your instrumentation investments.

The Field Units communicate in a secure, digital protocol over a band of frequencies from 902MHz to 928MHz. This data communication technique has been the backbone of the military's secure communications protocols for many years. These devices require no wires, permits or licenses, and they are easily set up and installed right out of the box.

You can use this device for long-term monitoring in remote locations, for short-term data gathering on process conditions, or to quickly test the economic viability of a new installation.

The purpose of this manual is to help you install and maintain your AWS Acoustic Monitor Field Unit. BEFORE setting up and installing the Field Unit please setup and configure the Base Radio.

1.3: UNPACKING

Remove the Packing List and check off the actual equipment received. If you have any questions about your shipment, please call your AWS Representative. Upon receipt of the shipment, inspect the container for any signs of damage in transit. Especially take note of any evidence of rough handling. Immediately report any apparent damage to the shipping agent.

Please note that sometimes units are assembled with accessories when shipped. Inspect the shipment carefully if you think that something is missing. This is rare, as we take considerable care to pack units for shipment, but it does sometimes happen. Please give us a call and we may be able to resolve this matter quickly over the phone.

NOTE

The carrier will not honor any claims for damage unless all shipping materials are saved for their examination. If damage is found during examining and removal of the contents, save the packing material and the carton.

1.4: SOFTWARE COMPATIBILITY

Software for AWS is revised periodically. Internal device software may contain portions that are not compatible with previous versions of the Wireless Instrumentation Manager software.

To ensure software compatibility, Wireless Instrumentation Manager software version 1.70.138 or later must be used. If you believe you are experiencing software compatibility issues please call Adaptive Wireless Solutions Technical Support at (978) 875-6000 or email techsupport@adaptive-wireless.com

Quick Start

This section summarizes what must be done in order to get the device installed, configured, and in operation quickly. However, it does not provide detailed or how-to information to perform the tasks outlined.

1. Place the Field Unit in the desired location of operation.
2. Turn on the Field Unit by simultaneously pressing and holding the ENTER and NEXT buttons until the unit powers up.
3. Set the RF CHAN setting equal to the Base Radio's RF Channel.
4. Set the BAUD RT setting equal to the Base Radio's Baud Rate.
5. Set the RF ID number to be a unique value between 1 and 100.
6. Select a normal transmission rate.
7. Select a normal sampling rate.
8. Select an abnormal transmission rate.
9. Select an abnormal sampling rate.
10. Set normal upper and lower values.
11. Select the engineering measurement units.



Warning



Warning! If the Field Units have been running for an extended period of time with no signal from the Base Radio (the Base Radio is off or not present), the Field Units will only search for the Base Radio every one hour or so. Turning the Field Units off and back on will cause them to begin searching immediately.

If the "RF OFF" message is being displayed on the Field Unit LCD, perform the following:

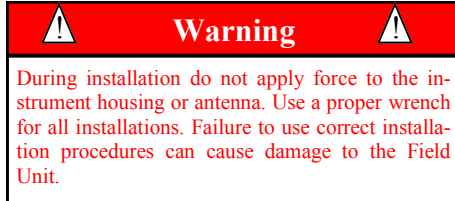
- Set the RF CHAN setting equal to the Base Radio's RF Channel.

If a "NO RF" message is being displayed on the Field Unit LCD, check the following:

- Is the Field Unit set to the above listed settings?
- Is the Base Radio on?
- Do the Field Unit and Base Radio settings match? (See Section 5 of Field Unit and Base Radio User Guides)
- Are the Base Radio and Field Units unable to communicate due to obstructions or distance? (See Section 3.1.1: Field Unit Positioning)

Installation

3.1: Mechanical Installation



In this section, mechanical installation instructions are discussed for the various setup capabilities of the Acoustic Monitor Field Unit.

Each AWS Acoustic Monitor Field Unit is a rugged device which provides optimal performance when installed with careful consideration. It may be utilized in any ultrasound measurement service so long as care is exercised to prevent exposing the sensing elements to excess stress or temperature. Installation practices greatly affect the life that you can expect from your AWS Acoustic Monitor Field Unit.

Give careful consideration to the environment where you will be installing your instrument. Avoid installations that expose the device to excess temperature, high vibration, considerable shock, or exposure to dripping condensate or corrosive materials. Also avoid installing the device in an unserviceable location.

Most often these problems can be avoided with some thought at the time of installation. The practices noted below are generally recommended, but they can only act as a guideline and cannot cover all possible variations. The final installation must be made at your discretion and approval. You must be the judge of the actual installation.

Dimensioned mechanical drawings for aid in mechanical installation are located in Section 8: Technical Specifications

3.1.1: Field Unit Positioning

Correct positioning of the Field Unit will ensure the best performance of the device. When planning the positioning of the Field Units, there are a few parameters that must be carefully considered:

- The top of the Field Unit should point upwards. The bottom of the Field Unit should NOT point directly at the Base Radio and the Field Unit LCD should point away from the Base Radio.
- All Field Units should maintain an approximate spacing of at least six feet apart from one another.
- The line of sight range between a Field Unit and Base Radio is 2000 feet at the 19.2K baud rate setting. Note that this range is reduced by the amount of RF noise present, obstructions, and the material properties of the obstruction.
- Only place the Field Unit in ambient operating temperatures of -40°F to 185°F (-40°C to 85°C).

Figure 3.1 gives examples of incorrect setups according to the previously mentioned parameters.

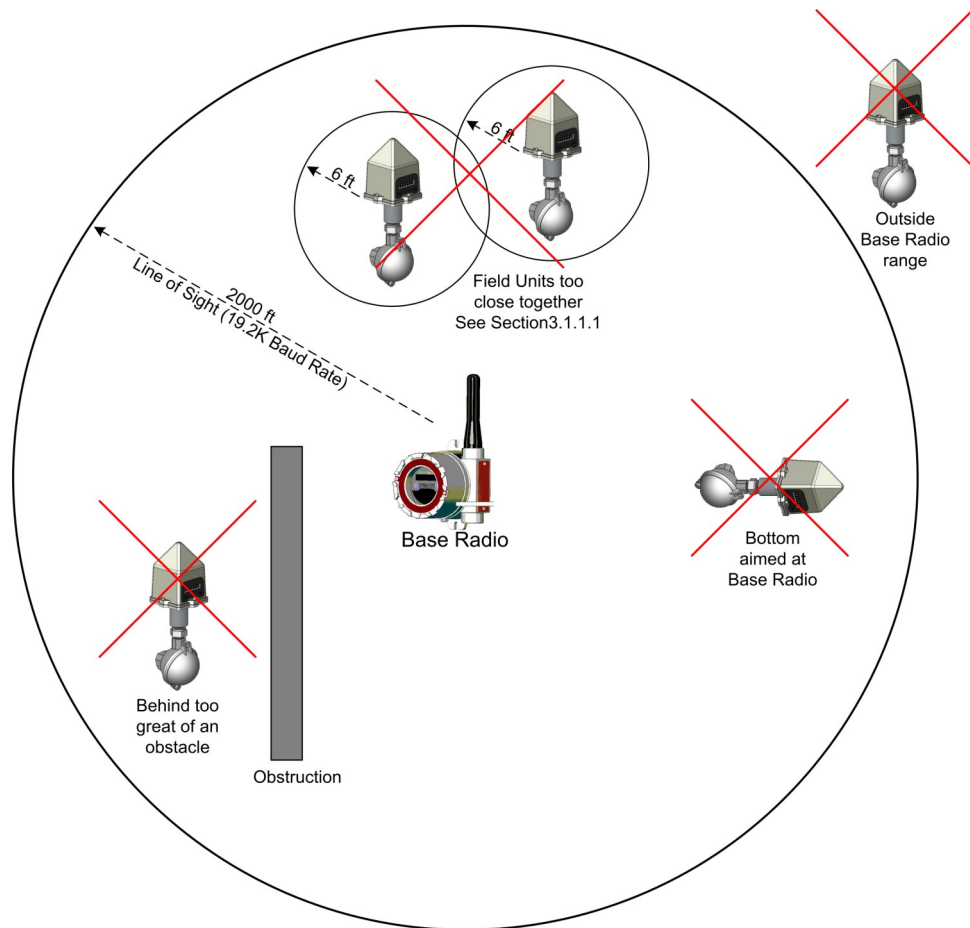


Figure 3.1: Examples of Incorrect Field Unit Positioning

Because there are so many setup possibilities we cannot cover them all. A correct setup would make sure that the above warnings are heeded, and that the Field Unit and Base Radio are capable of communication. The RF Placement Test section will help you to determine if you have selected the correct installation points and orientations for your application.

Remember, proper placement of the Field Unit will optimize your RF communication range and capabilities. Perhaps the best test to perform before mechanically mounting the unit is a quick hand-held test.

3.1.1.1: Technique for Close Positioning of Field Units

Field Units may be placed closely together by carefully following this procedure. If this procedure is not followed, the communication range of the Field Units will be significantly reduced and the Field Units may eventually lose communication with the Base Radio entirely. This procedure is easy to implement, but please read carefully for a full understanding.

The Base Radio synchronizes with the Field Units in synch groups of 7, organized by their RF ID numbers. If you want to place two Field Units closer than 6 feet, make sure that you have set them in different groups. Note that this only applies to Field Units that are communicating with the same Base Radio. The groups are defined in the following table:

Group	RF ID Range
1	1-7
2	8-14
3	15-21
4	22-28
5	29-35
6	36-42
7	43-49
8	50-56
9	57-63
10	64-70
11	71-77
12	78-84
13	85-91
14	92-98
15	99-100

For example, if two Field Units are placed one foot apart and the first Field Unit has an RF ID number of 027, that means it is in the 4th group (22-28). The second Field Unit must have an RF ID number that is in another group (less than 22 or greater than 28). Setting the RF IDs of two closely spaced Field Units so that the RF ID numbers are greater than 7 apart ensures that the Field Units are in different Base Radio sync groups. This allows the closely spaced Field Units to properly receive their synchronization signal from the Base Radio and maintain their proper communication and range.

You can also ensure that closely spaced Field Units maintain their synchronization with their Base Radio by simply assigning each of the two closely spaced Field Units to talk to a different Base Radio.

Either way, following this process will keep the Base Radio and Field Units properly synchronized for long-term communication.

3.2: Testing Communications

Remember, proper placement of the Field Unit will optimize your RF communication range and capabilities. Perhaps the best test to perform before mechanically mounting the unit is a quick hand-held test. There are two types of tests you can conduct: the RSSI (Received Signal Strength Indicator) Diagnostic and the Link Test. The RSSI Diagnostic measures the strength of the signal at the Field Unit. The Link Test measures the throughput of data sent to and from the Field Unit. The Link Test may be conducted from the Field Unit, Base Radio, or through WIM.

The RSSI Diagnostic should be conducted first to determine if the Base Radio is communicating with the Field Unit. Then the Link Test may be performed to test the validity of the installation.

To perform these tests you should have a good idea of where the Base Radio will be placed (for more information see Section 3 of the Base Radio User Manual). Place the Base Radio in the desired area and power on. Make sure that the Base Radio and Field Unit are on the same RF Channel and Baud Rate (See Section 5). You may also have to increment the number of Field Units with which the Base Radio is communicating (See the Base Radio User Manual Section 4.3).

Once both the Base Radio and Field Unit are set up to be on the same network, make sure communication is established by looking at the Field Unit LCD for the 'RF OK' message in the Read-Only Sequence (see Section 4.1.1).

After communications have been established, go to Section 3.2.1 for the RSSI Diagnostic or Section 3.2.2 for the Link Test.

3.2.1: Field Unit RSSI Diagnostic

NOTE

The RSSI Diagnostic may only be conducted from Field Units versions 1.56 and higher. The version number may only be checked when the Field Unit is powered up. See Figure 4.1.

The Field Unit should be placed in RSSI Diagnostic mode to determine the signal strength at the location of the equipment to be monitored.

The RSSI Diagnostic, located in the Field Unit's diagnostic menu, displays the RF signal strength in one of seven ranges. The signal strength is displayed on the LCD using a combination of '>' and '_' characters. Full signal strength is displayed as ">>>>>>>" while minimum signal strength is displayed as "> _ _ _ _ _". If the field unit is not communicating with the Base Radio (i.e. NO RF), all underscore characters will be displayed (" _ _ _ _ _ _ _").

The RSSI is measured every time the Field Unit receives a message from the Base Radio. The signal strength of the received message from the Base Radio is calculated during this time. The actual signal strength in dBm for each range is shown below:

>	>	>	>	>	>	>
Less than	Between	Between	Between	Between	Between	Greater than
-105 dBm	-105 dBm & -100 dBm	-100 dBm & -95 dBm	-95 dBm & -90 dBm	-90 dBm & -85 dBm	-85 dBm & -80 dBm	-80 dBm

3.2.1 Continued

To place the Field Unit in RSSI Diagnostic mode, follow the menu map shown below in Figure 3.2. Note that the RSSI menu is under the DIAGNSE menu and not the CONFIG menu.

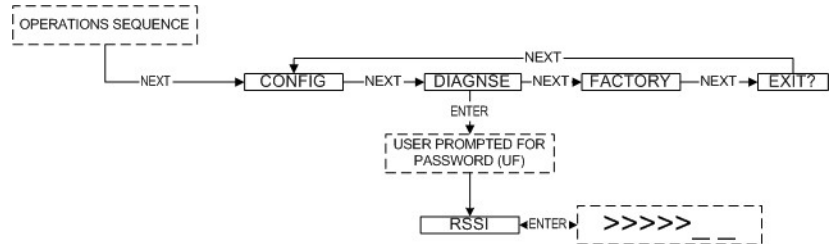


Figure 3.2: Menu Map to RSSI Mode

Now that the Field Unit is in the RSSI mode, bring the Field Unit close to the equipment you wish to monitor. Look at the LCD; notice the ‘>’ will constantly fluctuate. You should estimate an average value based on these fluctuations. The ideal signal integrity is seven arrows.

Once you have verified that you are receiving a signal, you should check to make sure the Field Unit is communicating properly with the Base Radio. To do so exit the RSSI by pressing ENTER, and then navigate to EXIT? of the diagnostic menu and return to the Operations Sequence shown in Figure 4.1 in Section 4.1.

NOTE

While using slower baud rate increases communication distance, it also increases the minimum transmit rate. See Section 5.2 for a list of the fastest transmit rates for each baud rate. This may not be suitable for your application.

If you see a NO RF message, then you do not have satisfactory RF communication with the Base Radio. If your application allows, move the Field Unit to a different position and check again for communications. If your application only allows you to mount at this particular point, you may want to try a slower baud rate setting for an increased range.

One final solution is to reposition the Base Radio. However, this may affect communications with previously installed Field Units, and if so, may require the use of a second Base Radio for your application. To select a better spot for the Base Radio, see Section 3.1.1 of the Base Radio User Manual.

3.2.2 Link Test

The Link Test measures the wireless link performance of a Field Unit running in its normal operating mode. Messages are sent from the Field Unit to the Base Radio at a predefined interval called the Transmit Rate (see Section 6.1). Each message contains data for the previous time period (since the last transmit). The Link Test looks at the wireless performance going in both directions, from the Field Unit to the Base Radio and vice versa, and comes up with a rating. The result that appears on the display shows the determined link strength.

In order to perform this test, the Field Unit must be communicating on the same channel and baud rate as the Base Radio. See Section 5 to configure communications.

The Link Test may be conducted from the Field Unit, Base Radio, or through WIM. Running the Link Test from WIM is ideal for testing communications for an installation with remote or hard-to-get-to Field Units. To conduct the Link Test from a Base Radio, see Section 3.2.2.2. To conduct the Link Test from WIM, see Section 3.2.2.3.

NOTE

The Link Test may only be conducted from Field Units, Base Radios and WIM versions 1.7 and higher. However, a Link Test being run from WIM version 1.7 may test communications with Field Units older than version 1.7.

The version number may only be checked when the Field Unit is powered up. See Figure 4.1.

3.2.2.1: Conducting a Link Test from the Field Unit

The Link Test is located in the Field Unit's diagnostic menu, see Figure 3.3.

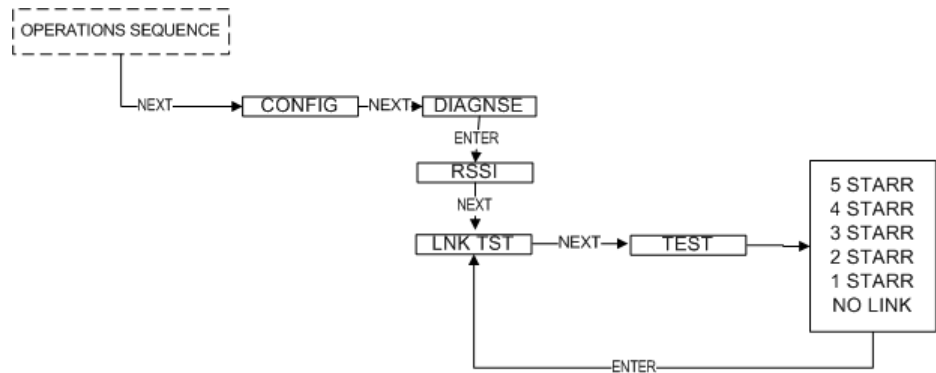


Figure 3.3: Menu Map to Field Unit Link Test

Using the NEXT and ENTER buttons, navigate to Link Test, and press the ENTER button to begin the test. The Field Unit will begin to test the link in both directions (to and from the Base Radio). During this time, the word TEST will appear on the LCD display. When the test is complete, the Field Unit will display the quality of the link. Be aware that the Field Unit uses the configured Baud Rate and transmission rate to perform this test. The length of time it will take to perform this test is dependent upon how fast the device is normally transmitting.

When enough messages have been observed, a link strength will be shown on the display. 5 STARR indicates the strongest link, while 1 STARR indicates the weakest link. The Link Test will continue to be evaluated and the rating on the screen may adjust itself. Keep in mind that the longer the Link Test runs the more data the Field Unit will have to evaluate.

The Field Unit installation site should strive to place the Field Unit in a location where it receives the highest number possible. A stronger link means less data re-transmits and better battery life.

3.2.2.2: Conducting a Link Test from the Base Radio

When the Link Test is conducted from a Base Radio, it measures the link strength between a selected Field Unit and the Base Radio. The Link Test data must be configured to match the communication parameters of the Field Unit from which you want to test. The Link Test is located in the Base Radio's diagnostic menu (see Figure 3.4).

To conduct a Link Test from the Base Radio, Navigate to Link Test, and press the Enter button. Next enter the RF ID for the Field Unit that you want to test. Then select the Normal Transmit rate that matches that of the Field Unit. If the Field Unit is transmitting at a different rate than the one you select in this menu, your results will be invalid.

3.2.2.2 Continued

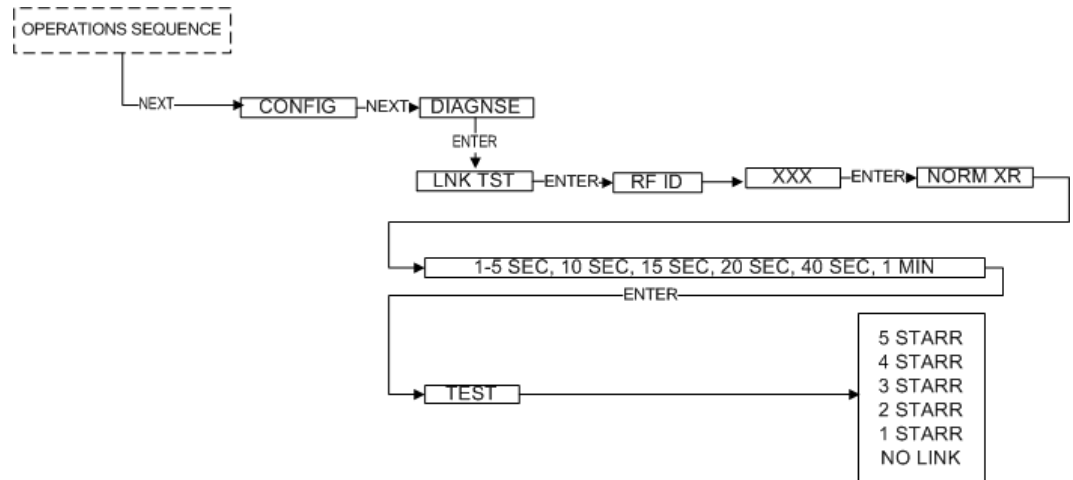


Figure 3.4: Menu Map to Base Radio Link Test

Once the Normal Transmit Rate is selected, the Link Test will immediately start. The Base Radio will begin to test the link from the Field Unit. During this time, the word TEST will appear on the LCD display. When the test is complete, the Base Radio will display the quality of the link. Be aware that the length of time it takes to perform this test is dependent upon how fast the Field Unit is normally transmitting.

When enough messages have been observed, a link strength will be shown on the display. 5 STARR indicates the strongest link, while 1 STARR indicates the weakest link. The Link Test will continue to be evaluated and the rating on the screen may adjust itself. Keep in mind that the longer the Link Test runs the more data the Field Unit will have to evaluate.

The Field Unit installation site should strive to place the Field Unit in a location where it receives the highest number possible. A stronger link means less data re-transmits and better battery life.

3.2.2.3: Conducting a Link Test from WIM

To conduct a Link Test from WIM, make sure that WIM is running on the PC attached to the Base Radio that you are communicating with. Then go to the Field Unit view, and right-click on the Field Unit you want to test Received data transmission from (Figure 3.5).

3.2.2.3 Continued

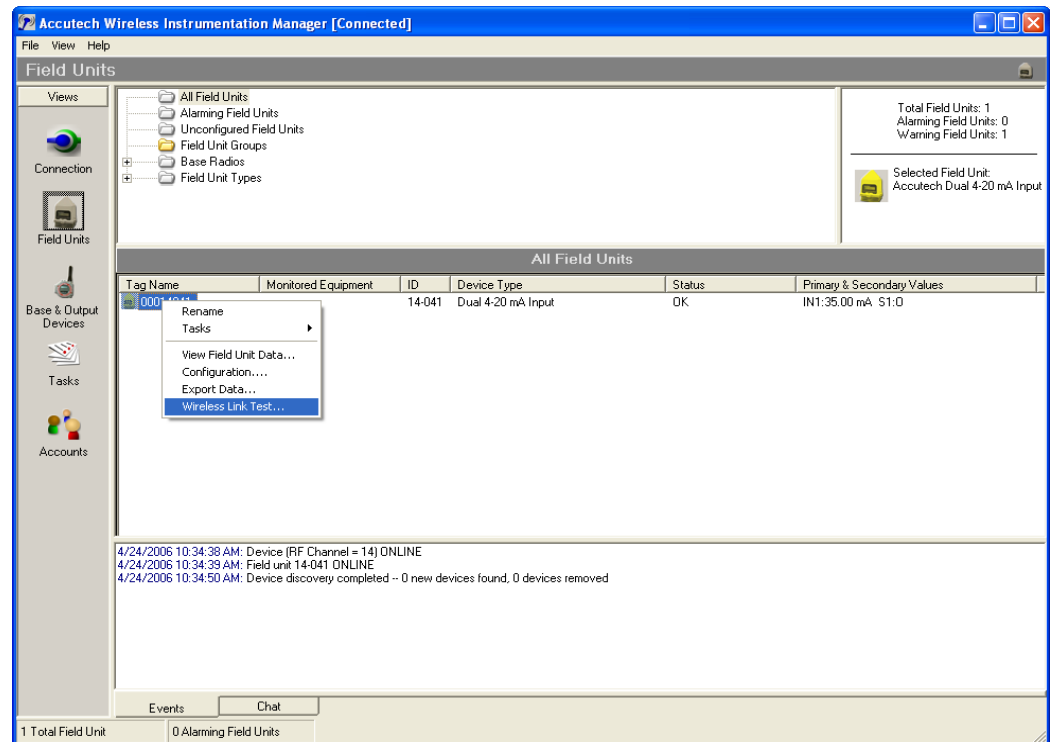


Figure 3.5: WIM Field Unit View

Select **Wireless Data Loss Test...** from the popup menu.

The Wireless Data Loss Test window appears (Figure 3.6). The name of the Field Unit being tested appears in the title bar in parenthesis.

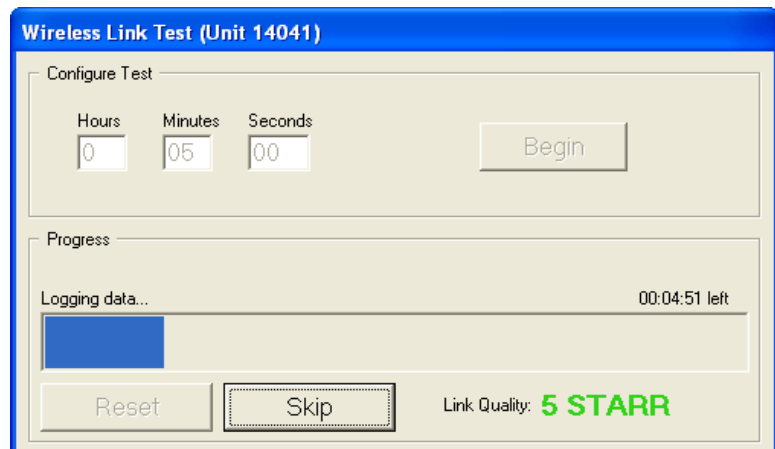


Figure 3.6: Wireless Data Loss Test

In the top of the window, you can configure the test to run for a specified amount of time. The longer the test, the more data the test will have to do an evaluation. Type the length of time that you want to run the test and click Begin to start. Once the test starts, WIM will reconfigure the Field Unit's Transmit Rate to the fastest possible for the selected Baud Rate. These rates are listed in Section 5.2. After the test has completed, it will restore the previously configured Transmit Rate.

3.2.2.3 *Continued*

During the test, the communications reliability is evaluated while the Field Unit is running under normal operating conditions. As the test runs, a link strength will be shown in the lower right hand corner of the window. 5 STARR indicates the strongest link, while 1 STARR indicates the weakest link. The Link Test will continue to be evaluated and the rating on the screen may adjust itself for the specified amount of time.

General Configuration

This section discusses the generalities for configuring the Field Unit via the NEXT and ENTER buttons. The subsections are as follows:

- 4.1: Field Unit Displayed Messages
 - 4.1.1: The Read-Only Sequence
- 4.2: Overall Configuration Menu Map
- 4.3: Setting the Field Unit Tag Name
- 4.4: Setting a User Password
- 4.5: Resetting All Field Unit Settings

4.1: Field Unit Displayed Messages

NOTE

During configuration and testing, keep Field Units at least six feet from the Base Radio and other Field Units. .

To turn the Field Unit on, press and hold both the NEXT and ENTER buttons for a few seconds. Upon power up, the Field Unit will display the Power-Up Sequence, and then go into the Operations Sequence. These Sequences are shown in Figure 4.1 below:

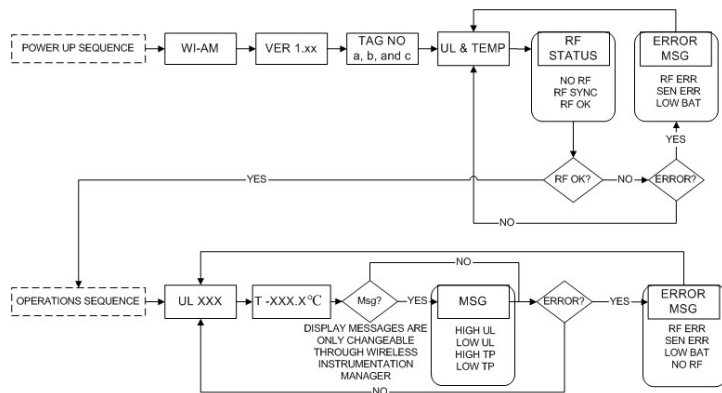
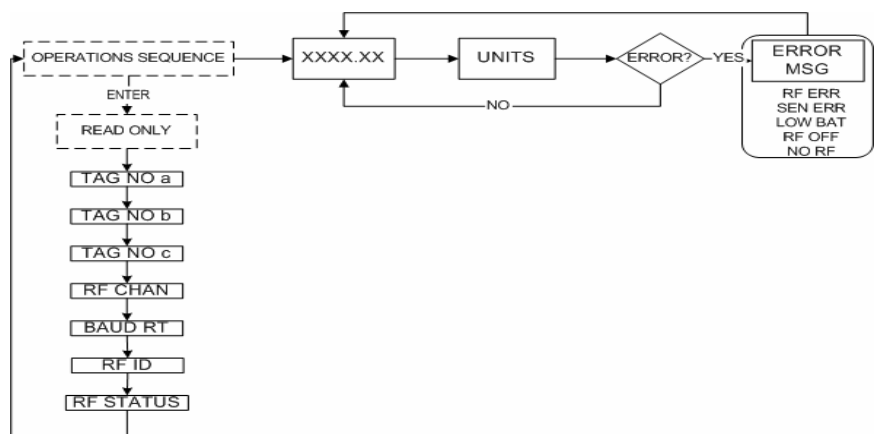


Figure 4.1: Field Unit Power-Up and Operations LCD Sequences

4.1.1: The Read-Only Sequence

Once the Field Unit is in the Operations Sequence, a user may access the READ-ONLY Sequence without a password by simply pressing the ENTER button at any time. The Read-Only Sequence, as shown in Figure 4.2, displays extra information about the current settings of the Field Unit that is not seen during the Operations Sequence, but does not allow any changes to be made to these settings.



4.2: The Read-Only Sequence

4.2: Overall Configuration Menu Map

NOTE

The user must enter a four-digit password to enter the CONFIG and DIAGNSE menus. The FACTORY menu is for factory use only. The default user password is 0000. For more information about the password see Section 4.4.

A complete Field Unit Menu Map is shown in Appendix C. Below is an overall view of the configuration menu to aid the user in setting up the Field Unit for proper operation.

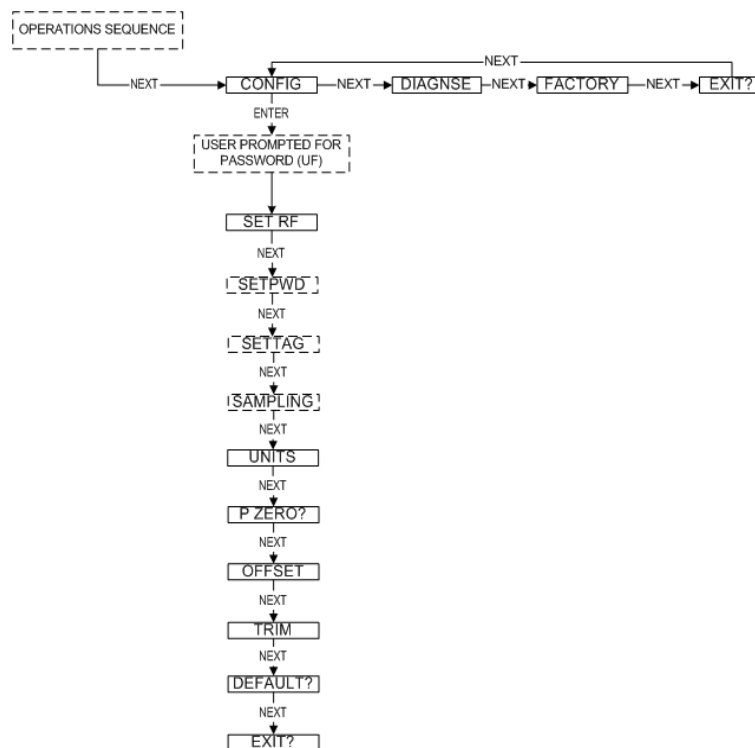


Figure 4.3: Overall Configuration Menu Map

4.3: Setting the Field Unit Tag Name*

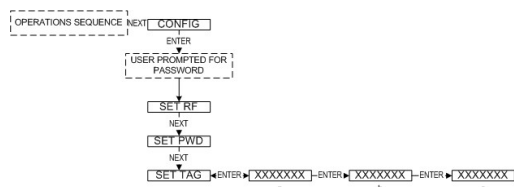


Figure 4.4: Menu Map to Tag Name

Each Field Unit also has a user-settable Field Unit Tag Name. This tag name is displayed upon Field Unit power up, and when the Read-Only Sequence is selected. The Tag Name is a 21-character string that is displayed in three separate 7-character flashes on the Field Unit LCD.

The user may choose from A-Z, 0-9, a dash (“-”), and an underscore (“_”). The underscore has a special meaning to the software inside the Field Unit. For example, if you have a Tag Name that is only 5 characters long, then you do not want to wait for the rest of the 16 characters to be displayed on the LCD. So if your Tag Name was “TRAP1”, you would want to enter the Tag Name like this: “TRAP1 _____”.

Using Wireless Instrumentation Manager

NOTE

Once WIM has been used to configure the Field Unit, this menu option will be disabled on the Field Unit LCD menu.

If you have the Wireless Instrumentation Manager software this menu option will not be accessible via the Field Unit once the Field Unit detects that the software is being used (See Appendix A for more details). The tag name should be entered using the Wireless Instrumentation Manager software. To do so, when the software is in the Field Unit view (See Section 8.1 of the Wireless Instrumentation Manager User Manual), right-click the Field Unit icon and select **Rename**, then enter the tag name you wish the Field Unit to have.

This tag name will then be downloaded to the Field Unit and can be displayed by pressing the ENTER button when the unit is in the Operations Sequence (See Section 4.1.1 of this manual)

* Indicates that Menu is Disabled if Wireless Instrumentation Manager is detected. (See Appendix A)

4.4: Setting a User Password*

Each Field Unit has a password that will lock out undesired users from making changes to the Field Unit. Any user may still view some of the Field Unit settings by pressing the ENTER key during the Operations Sequence and viewing the Read-Only Sequence.

The password is a four-digit password. The factory default is 0000. If you wish to select a different password, follow the Field Unit Menu Map shown in Figure 4.5 to change it.

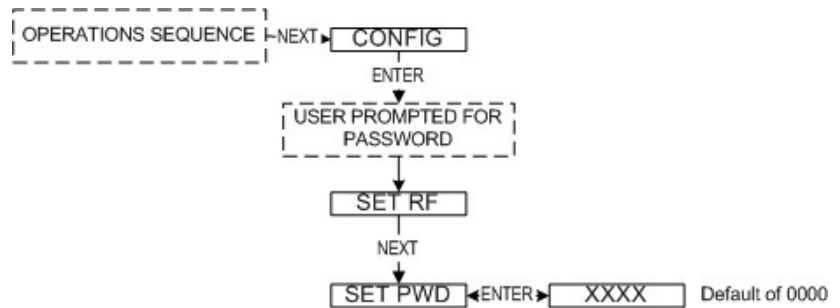


Figure 4.5: Menu Map to Password Setting

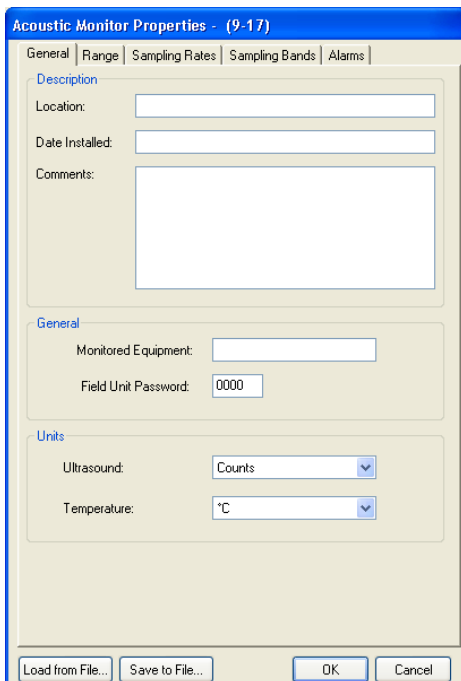


Figure 4.6: Password Setting Using Wireless Instrumentation Manager

If you have the Wireless Instrumentation Manager software this menu option will not be accessible via the Field Unit once the Field Unit detects that the software is being used (See Appendix A for more details). The password should be entered using the Wireless Instrumentation Manager software. To do so, enter the configuration menu (See Section 9.2 of the Wireless Instrumentation Manager User Manual). Once in the configuration menu click on the **General** tab to bring up the general information as shown in Figure 4.6.

The Field Unit password for this device can be set by entering a four-digit number in the **Field Unit Password** field. Once a password has been entered, click **OK** to save and download the password to the Field Unit.

Please note that the password only protects the Field Unit from unauthorized configuration via the NEXT and ENTER buttons. The Wireless Instrumentation Manager requires a user login password to gain access to all configuration parameters. However, user accounts are available and can be set with different access levels and restrictions (For more information on user accounts see the Wireless Instrumentation Manager User Manual Section 8.4).


4.5: Resetting All Field Unit Settings

To reset all Field Unit settings to their default state, the user must navigate to the DEFAULT menu option in the CONFIG menu via the keypad.

Once at the default menu option pressing the ENTER button will display 'RESET?' on the LCD; which asks if the user is sure he or she wants to reset the device to its default configuration. The user will then be prompted with 'NO' on the LCD. Pressing the ENTER button while 'NO' is being displayed will NOT reset the device. Pressing the NEXT button will display 'YES' on the LCD. If the user presses the ENTER button while 'YES' is being displayed the device will be reset.

* Indicates that Menu is Disabled if Wireless Instrumentation Manager is detected. (See Appendix A)

Configuring the RF Communications

Warning  **Warning!** If the Field Units have been running for an extended period of time with no signal from the Base Radio (the Base Radio is off or not present), the Field Units will only search for the Base Radio every one hour or so. Turning the Field Units off and back on will cause them to begin searching immediately.

5.1: RF Channel Selection

NOTE

The RF Channel defines a set of frequencies on which communication takes place between the Base Radio and the Field Unit. Each RF Channel has a different set of frequencies, thus allowing the user to have multiple different wireless networks co-existing throughout the same facility.

The RF Channel can be thought of as a set of walkie-talkies. If both walkie-talkies are on channel one they can communicate. If a walkie-talkie is on channel one and the other is on channel two, they cannot communicate. Likewise, if two walkie-talkies are on channel one and two other walkie-talkies are on channel two, the walkie-talkies on channel one cannot hear what is being transmitted by the walkie-talkies on channel two.

5.2: Baud Rate Selection

NOTE

If you change the baud rate of a Field Unit, you must also change the baud rate of the Base Radio and all other Field Units that are communicating with that Base Radio to match.

In order for the Field Unit and the Base Radio to communicate, they must be on the same RF Channel and must be transmitting at the same Baud Rate. While all Field Units and Base Radios are set to default configurations at the factory, if any configuration differences are present the Base Radio will not be able to communicate with the Field Units. The subsections are as follows:

- 5.1: RF Channel Setup
- 5.2: Baud Rate Setup
- 5.3: RF Identification Setup

All Base Radios and Field Units can be set to one of 16 different RF channels. The only Field Units recognized by a particular Base Radio are the units that are on the same RF Channel as that Base Radio. This allows the user to decide which Field Units communicate with each Base Radio.

Each Field Unit comes from the factory with the RF Channel set to OFF. This means the Field Unit will not communicate to any Base Radio. To set the Field Unit for communication, first determine the channel that you want to use. Then follow the Field Unit menu map shown below in Figure 5.1 to configure the RF Channel.

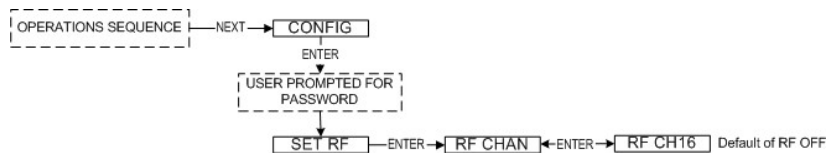


Figure 5.1: Menu Map to RF Channel Setting

Once in the RF Channel menu, increment it by pressing the NEXT button. When selecting this value, do not choose an RF Channel that is currently being used by other AWS Wireless Systems as this can cause communication problems.

The RF Baud Rate refers to the speed at which the Base Radio and Field Units communicate. The RF baud rate for the Base Radio and the Field Unit must be the same in order for successful communication to occur. There are three selectable settings with the fastest update times and ranges listed below:

- 4.8K– Rate of 4.8 Kbaud (Update every 20 seconds)
- Range of 3000ft (Line of Sight)
- 19.2K– Rate of 19.2 Kbaud (Update every 5 seconds)
- Range of 2000ft to 2500ft (Line of Sight)
- 76.8K– Rate of 76.8 Kbaud (Update every 1 second)
- Range of 500ft to 750ft (Line of Sight)

A faster RF Baud Rate allows the user to transmit more information in a given period of time, but it will also limit the Field Unit's range. If you need more distance out of your Field Units or are encountering difficulties by frequently losing communications, then select a slower baud rate.

Follow the Base Radio menu map shown in Figure 5.2 to configure the RF Baud Rate. The factory default is the 19.2K Baud Rate.

5.2: Continued

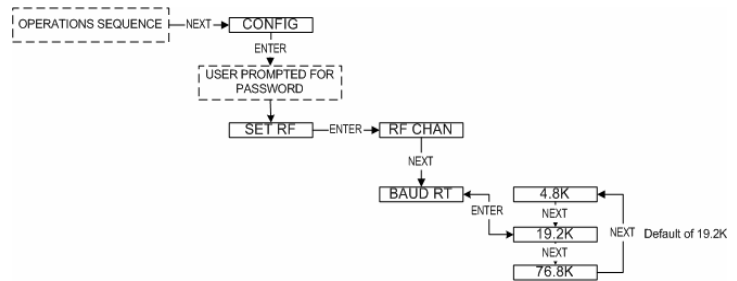


Figure 5.2: Menu Map to Baud Rate Setting

5.3: RF Identification Selection

Each Field Unit is identified by the Base Radio and software according to the RF Identification (ID) given to that particular unit. Two Field Units CANNOT have the same ID and be on the same RF Channel (if you do not know the RF Channel see section 5.1). If the Field Unit is in the Operations Sequence, pressing the ENTER button displays the Read-Only Sequence on the LCD, which displays the ID of that unit like this: ID 3.

All Field Units in your system are set to a default ID number upon shipment. For example, if you have ordered a Base Radio and three Field Units, the Field Units will be configured to ID's 0, 0 and 0. You must set these units to three different IDs between 1 and 100. The Field Units in this example could be set to RF IDs 1, 2 and 3.

First determine the ID's you'd like to give each unit. Then follow the menu map shown in Figure 5.3 to configure the RF ID. The factory default is RF ID 0, which disables the RF communication of the unit.

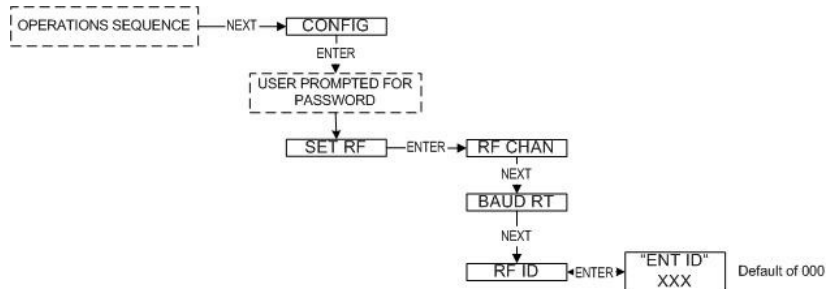


Figure 5.3: Menu Map to RF ID Setting

Once you have selected the RF ID you wish to use for this particular Field Unit, save and exit the menus and return to the Operations Sequence.

The Field Unit should now be successfully configured to the Base Radio. To check this, press ENTER while the Field Unit is in the Operations Sequence for the Read-Only Sequence to be displayed. You may see an RF SYNC message displayed on the Field Unit LCD. This means that the Field Unit and Base Radio are attempting to synchronize communications. If this is successful the RF Status will display an RF OK message. If this is unsuccessful the RF Status will display a NO RF message.

Also notice the two small arrows on either side of the LCD; if they are fluctuating up and down, that indicates the Field Unit and Base Radio are successfully communicating. If only one or none of the arrows are moving then RF communication is unsuccessful.

Configuring the Sampling and Transmission Rates

The AWS Acoustic Monitor Field Unit is very versatile with many programmable features and can be used in numerous different applications. Because no two applications are the same, some configuration is required for each unit. This section will walk you through the initial configuration of these Sample and Transmit settings. The subsections are as follows:

- 6.1: Selecting the Normal Transmission Rate
- 6.2: Selecting the Normal Sampling Rate
- 6.3: Selecting the Abnormal Transmission Rate
- 6.4: Selecting the Abnormal Sampling Rate
- 6.5: Selecting the Normal Upper and Lower Values
- 6.6: Selecting Rates, Thresholds, and Deadbands via the Software

6.1: Selecting the Normal Transmission Rate*

The Normal Transmission Rate is the interval in which the Field Unit transmits data to the Base Radio. The Field Unit is in a “sleep” mode to save power during the operations sequence. This mode turns off most of the electronics on the unit, with the exception of the LCD, in order to preserve battery life. The Field Unit will then ‘wake up’ every Normal Sampling Period and take the necessary process value readings. The Field Unit will then transmit these readings to the Base Radio on an interval determined by the Normal Transmission Rate.

Notice that the fastest update rate of the Normal Transmission Rate is dependent on the baud rate setting you selected earlier (see Section 5.2). The transmission rates cannot update data faster than their communication speed allows. Thus, if you selected the 19.2K Baud Rate setting, your fastest transmission rate will be 5 seconds. The Field Unit automatically determines these settings and adjusts the menu options accordingly. A complete table of these parameters is shown in Section 6.2.

In order to properly set the Normal Transmission Rate, you must first determine how often you need updates from the Field Unit. You have a selectable range of 1-5, 10, 15, 20, 40 seconds and 1 minute. The factory default is 10 seconds.

If all of the data does not get through, the data is resent the following second. This prevents data from being lost. However, if the Transmission Rate is set to the maximum (1 second; 76.8K baud), then the data cannot be resent the following second because the next set of data must be sent in order to meet the Transmission Rate.

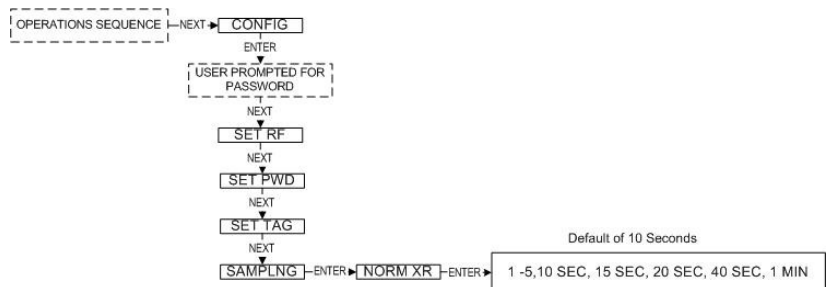


Figure 6.1: Menu Map to Normal Transmission Rate Setting

Using Wireless Instrumentation Manager

If you have the Wireless Instrumentation Manager software this menu option will not be accessible via the Field Unit once the Field Unit detects that the software is being used (See Appendix A for more details). An explanation of how to select the Normal Transmission Rate using the Wireless Instrumentation Manager software can be found in section 6.6.

* Indicates that Menu is Disabled if Wireless Instrumentation Manager is detected. (See Appendix A)

6.2: Selecting the Normal Sampling Rate*

The Normal Sampling Rate is the interval in which the Field Unit reads the monitored process value. As previously mentioned, the Field Unit is in “sleep” mode to save power during the operations sequence. This mode turns off most of the electronics on the unit (with the exception of the LCD) in order to preserve battery life. The Field Unit will then ‘wake up’ for every Normal Sampling Period and take the necessary process value readings.

Notice that the minimum speed of the Normal Sampling Rate is dependent on the Normal Transmission Rate setting selected (see Section 6.1). The Sampling Rate cannot be set slower than the Normal Sampling Rate. Thus, if you selected the Normal Transmit Rate setting to be 10 Seconds the Normal Sampling Rate must be set to 10 Seconds or faster. A complete table of these parameters is shown below.

Baud Rate (communication range) (fastest speed of updates)	76.8K	19.2K	4.8K
	500-750 feet	2000-2500 feet	3000 feet
	1 Second	5 Seconds	20 Seconds
Normal and Abnormal Transmit Rates	1 Second or Greater	5 Seconds or Greater	20 Seconds or Greater
Normal and Abnormal Sampling Rates	Equal to Transmit Rate or Less	Equal to Transmit Rate or Less	Equal to Transmit Rate or Less

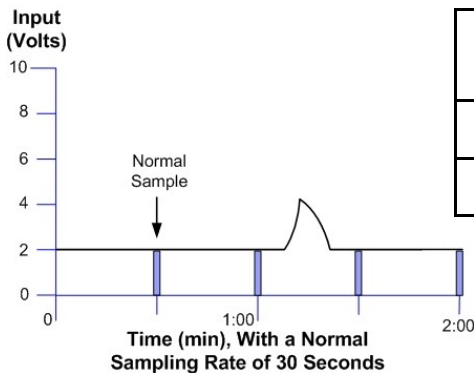


Figure 6.2: Incorrect Sampling Rate

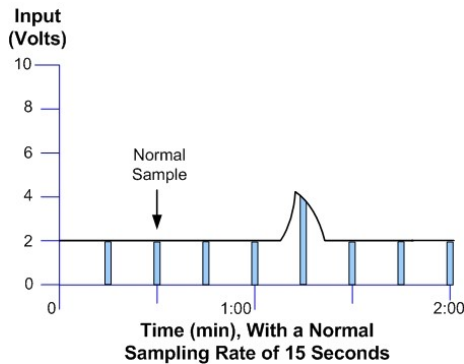


Figure 6.3: Correct Sampling Rate

In order to properly set the Normal Sampling Rate determine how often updates are needed from the Field Unit when the process being monitored is operating under normal conditions. The Field Unit has a selectable range of 1-5, 10, 15, 20, 30, and 60 seconds depending on the Normal Transmission Rate. The factory default is 1 second. However, the more frequently the Field Unit wakes up to check the monitored device, the faster you will use up the battery life of the Field Unit.

Figure 6.2 is an example of what happens when the Normal Sampling Rate is too slow for the process being monitored. Notice how the rise in the voltage level falls between two normal samples, and thus goes completely undetected.

Figure 6.3 is an example of what happens when the Normal Sampling Rate is correctly set for the device that is being monitored. Notice how this setting makes it possible to sample the rise in the voltage level.

Once you have decided on the proper Normal Sampling Rate follow the Field Unit menu map shown in Figure 6.4 to select this setting. The factory default is 1 second.

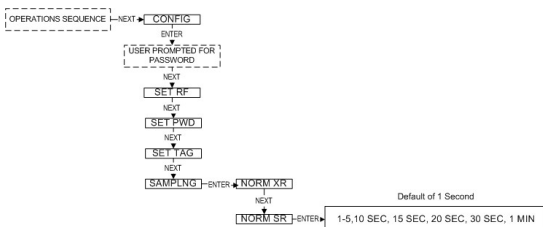


Figure 6.4: Menu Map to Normal Sampling Rate Setting

Using Wireless Instrumentation Manager

If you have the Wireless Instrumentation Manager software this menu option will not be accessible via the Field Unit once the Field Unit detects that the software is being used (See Appendix A for more details). An explanation of how to select the Normal Sampling Rate using the Wireless Instrumentation Manager software can be found in section 6.6.

* Indicates that Menu is Disabled if Wireless Instrumentation Manager is detected. (See Appendix A)

6.3: Selecting the Abnormal Transmission Rate*

NOTE

If the device is not configured to check for abnormal process conditions using the Sampling Bands (section 6.6.2), the Abnormal Transmission Rate is not used and this section can be ignored.

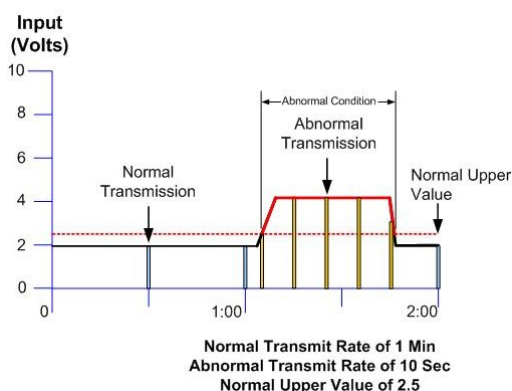


Figure 6.5: Example of Abnormal Transmission Rate Setting

The Abnormal Transmission Rate is identical to the Normal Transmission Rate with one exception. The Abnormal Transmission Rate only applies while the Field Unit is in an abnormal condition (see Section 6.5 Selecting the Normal Upper and Lower Values). This allows an increase or decrease in the frequency of information you receive depending on the operating conditions of the process being monitored.

In order to properly set the Abnormal Transmission Rate, determine how often updates are needed from the Field Unit when the process being monitored is operating under normal conditions. The Field Unit has a selectable range of 1-5, 10, 15, 20, 40 seconds and 1 minute. Figure 6.5 is an example of how the device switches transmission rates from Normal Transmission Rate to Abnormal Transmission Rate. Note how the first abnormal transmission is sent immediately when the Normal Upper Value set point is exceeded. The next transmission will then follow this immediate transmission by 10 seconds (or whatever the Abnormal Transmission Rate is set to). The transmissions will continue at this interval until the process value drops below the Normal Upper Value set point.

Once the process value drops below this set point, another transmission is sent to the Base Radio. The transmissions will then be sent at the Normal Transmission Rate of one minute (the current setting for the Normal Transmission Rate) from the time of the last abnormal transmission.

The user should also note that the transmission time depends on the sampling rate, and when the process value is sampled. If the Normal Sampling Rate is 30 seconds, then the process value may be above the Normal Upper Value for up to 29 seconds before an abnormal condition is detected. This means that the transmission could be as late as 29 seconds after the process value exceeded the Normal Upper Value.

Once you have decided the proper time for the Abnormal Transmission Rate follow the Field Unit menu map shown in Figure 6.6.

Using Wireless Instrumentation Manager

If you have the Wireless Instrumentation Manager software this menu option will not be accessible via the Field Unit once the Field Unit detects that the software is being used (See Appendix A for more details). An explanation of how to select the Abnormal Transmission Rate using the Wireless Instrumentation Manager software can be found in section 6.6.

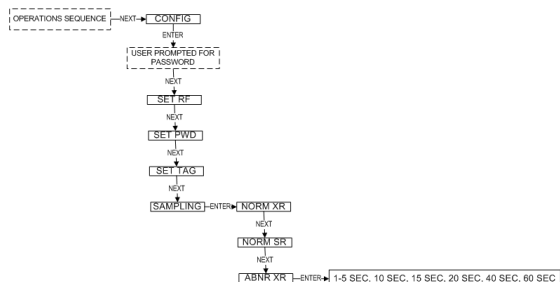


Figure 6.6: Menu Map to Abnormal Transmission Rate Setting

* Indicates that Menu is Disabled if Wireless Instrumentation Manager is detected. (See Appendix A)

6.4: Selecting the Abnormal Sampling Rate*

NOTE

If the device is not configured to check for abnormal process conditions using the Sampling Bands, the Abnormal Sampling rate is not used and this section can be ignored.

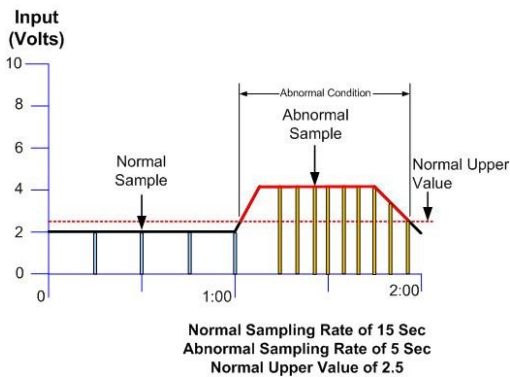


Figure 6.7: Example of Abnormal Sampling Rate Setting

The Abnormal Sampling Rate is identical to the Normal Sampling Rate with one exception. The Abnormal Sampling Rate only applies while the Field Unit is in an abnormal condition (see 6.5 Selecting the Normal Upper and Lower Values). This allows an increase or decrease of the frequency of information you receive depending on the operating conditions of the process being monitored.

In order to properly set the Abnormal Sampling Rate, determine how often updates are needed from the Field Unit when the process being monitored is operating under normal conditions. The Field Unit has a selectable range of 1-5, 10, 15, 20, 30 seconds and 1 minute. Figure 6.7 is an example of how the device switches sampling methods from Normal Sampling Rates to Abnormal Sampling Rates. Note how the first abnormal sample is taken a few seconds after the Normal Upper Value set point is exceeded. The next sample will then follow this sample by 5 seconds (or whatever the Abnormal Sampling Rate is set to). These samples will continue at this interval until the process value drops below the Normal Upper Value set point.

Once the process value drops below this set point the sampling rate will return to the Normal Sampling Rate. Also, the Abnormal Sampling must be equal to or faster than the Abnormal Transmission Rate.

The user should also note that the transmission time depends on the sample rate, and when the process variable is sampled. If the Normal Sampling Rate is 30 seconds, then the process variable may be above the Normal Upper Value for up to 29 seconds before abnormal condition is detected. This means that the transmission could be as late as 29 seconds after the process variable exceeded the Normal Upper Value.

Once you have decided the proper time for the Abnormal Sampling Rate follow the Field Unit menu map shown in Figure 6.8.

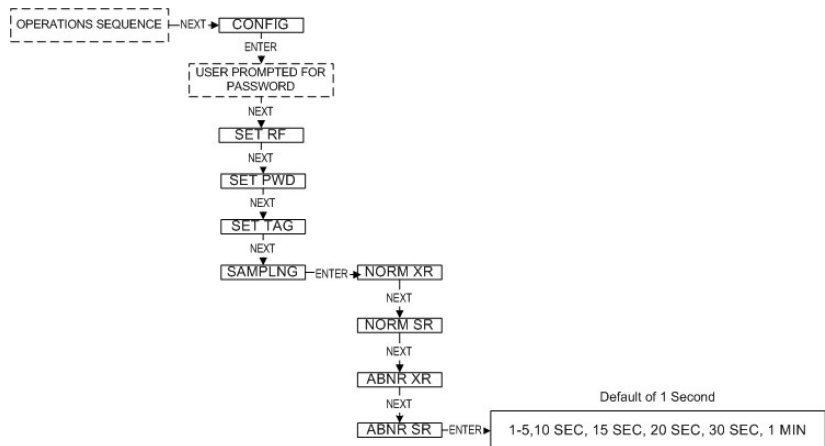


Figure 6.8: Menu Map to Abnormal Sampling Rate Setting

Using Wireless Instrumentation Manager

If you have the Wireless Instrumentation Manager software this menu option will not be accessible via the Field Unit once the Field Unit detects that the software is being used (See Appendix A for more details). An explanation of how to select the Abnormal Sampling Rate using the Wireless Instrumentation Manager software can be found in section 6.6.

* Indicates that Menu is Disabled if Wireless Instrumentation Manager is detected. (See Appendix A)

6.5: Selecting the Normal Upper and Lower Values*

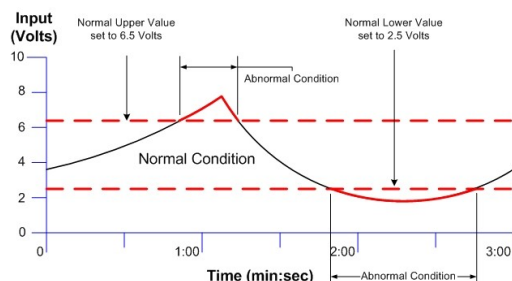


Figure 6.9: Normal Upper and Lower Value Example

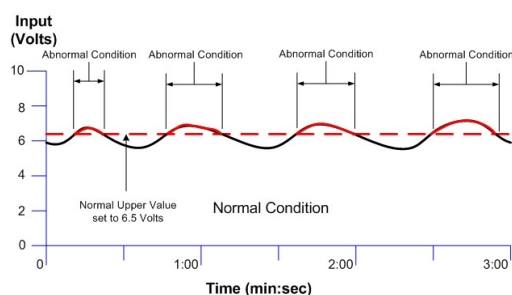


Figure 6.11: Condition "Chatter" Without Time Deadband

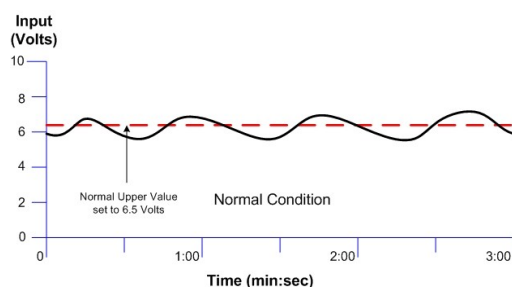


Figure 6.12: Condition "Chatter" Elimination Due to Time Deadband

Using Wireless Instrumentation Manager

Each AWS Field Unit is equipped with an analog input level upper and lower value. As the analog input is measured, it is compared to a set threshold value. Depending upon the setting of that value, whether it is enabled or not, and what the Time Deadband is, the Field Unit will enter an Abnormal condition as seen in Figure 6.9.

The Normal Upper Value would be an indication that the analog input is 'high' and the Normal Lower Value would be an indication that analog input is 'low'. Thus the normal operating condition for the input application would be found in between the two Normal Values. To configure the values, follow the Field Unit menu map shown in Figure 6.10.

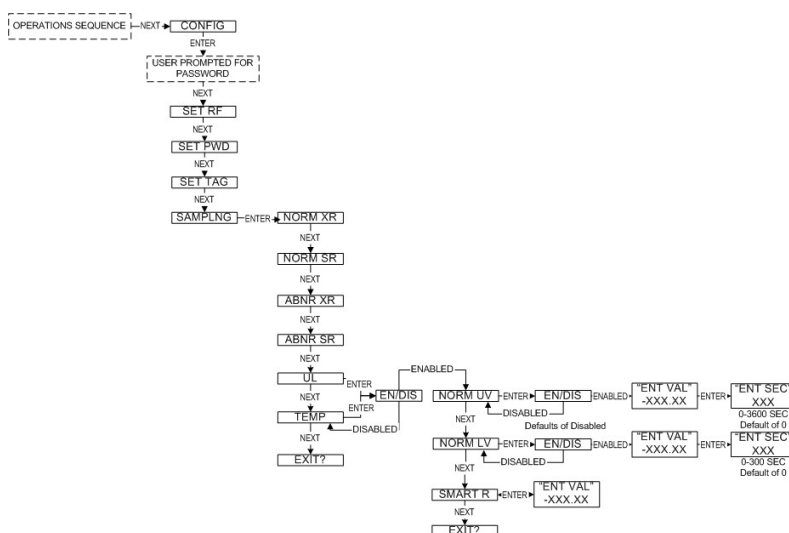


Figure 6.10: Menu Map to Normal Upper and Lower Value Settings

When configuring the Normal Values you will first be prompted to enable the input. You should only disable an input if it will not be used.

Once an input has been enabled, the user may enter a Normal Upper Value, Normal Lower Value and the Smart Rate Threshold (see Section 6.5). If, for example, the Normal Upper Value is enabled, the next prompt you will receive is -XX.XX for the process variable value. Increment this value to the desired value and press the ENTER button. (The "-" may be toggled on and off as well).

The final prompt you will receive is the Time Deadband prompt. The Time Deadband refers to the number of seconds that the measured reading must stay in a certain condition before the Field Unit will actually switch to that condition. To select a proper Time Deadband, consider the example in Figure 6.11. Notice that the Field Unit continues to cycle from Normal to Abnormal Conditions because the input value is fluctuating around the 7.5 Volt Normal Upper Value. This is undesired. The addition of a few second delay before the Field Unit switches conditions will eliminate this "chatter", as seen in Figure 6.12.

If you have the Wireless Instrumentation Manager software this menu option will not be accessible via the Field Unit once the Field Unit detects that the software is being used (See Appendix A for more details). An explanation of how to select the Abnormal Sampling Rate using the Wireless Instrumentation Manager software can be found in section 6.6.

* Indicates that Menu is Disabled if Wireless Instrumentation Manager is detected. (See Appendix A)

6.6: Selecting Rates, Thresholds, and Dead-bands via the Software

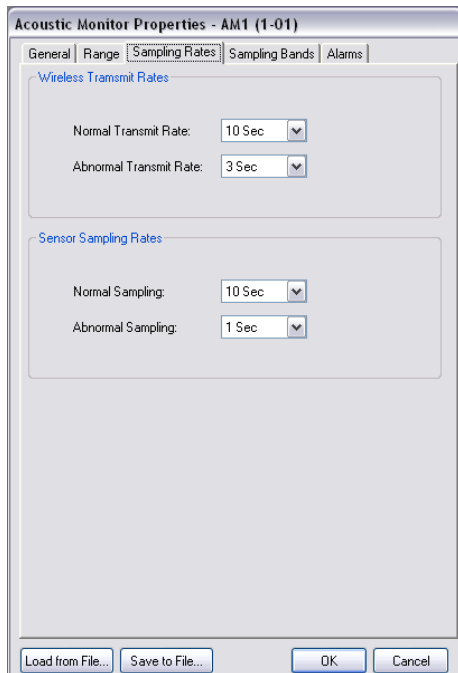


Figure 6.13: Sampling and Transmission Rate Selection Using the Software

If you have the Wireless Instrumentation Manager software the Normal and Abnormal Sampling and Transmission menu options will not be accessible via the Field Unit once the Field Unit detects that the software is being used (See Appendix A for more details). These settings should be entered using the Wireless Instrumentation Manager software. To do so, enter the configuration menu (See Section 9.2 of the Wireless Instrumentation Manager User Manual). Once in the configuration menu click on the **Sampling Rates** tab to bring up the sampling rate information, as shown in Figure 6.13.

To select the Normal Transmission Rate, select one of the time periods from the drop box. Next, select an Abnormal Transmission Rate in the same manner. Note that the Normal and Abnormal Transmission Rate can be the same.

Once the transmission rates have been selected, the user should select the desired sampling rates. Note that the sampling rate must be equal to or faster than the associated transmit rate. For example, in Figure 6.13 the Normal Transmission Rate is set to 10 seconds and the Normal Sampling Rate is also set to 10 seconds. This is a valid configuration. Another example in Figure 6.13 is the Abnormal Transmission Rate being set to 3 seconds and the Abnormal Sampling Rate being set to 1 second.

If you incorrectly enter the Transmission and Sampling Rates, a message will be displayed explaining this. You will not be allowed to enter an incorrect setting.

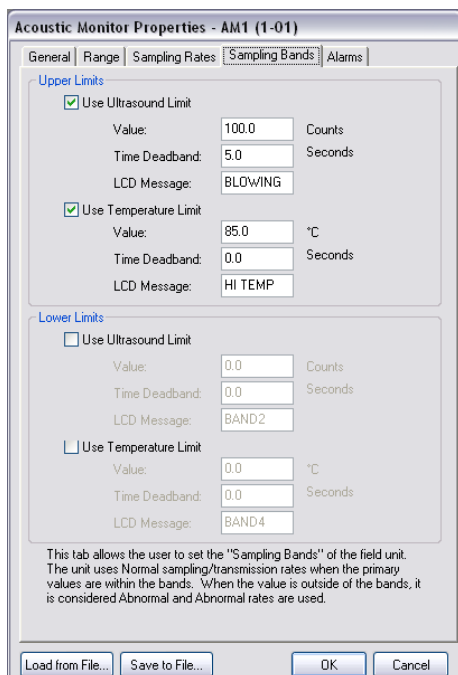


Figure 6.14: Normal Upper and Lower Value Selection Using the Software

Using Wireless Instrumentation Manager

If you have the Wireless Instrumentation Manager software the Normal and Normal Upper and Lower Value menu options will not be accessible via the Field Unit once the Field Unit detects that the software is being used (See Appendix A for more details). These settings should be entered using the Wireless Instrumentation Manager software. To do so, enter the configuration menu (See Section 9.2 of the Wireless Instrumentation Manager User Manual). Once in the configuration menu click on the **Sampling Bands** tab to bring up the sampling band information as shown in Figure 6.14.

To set a limit to the normal condition, enable the limit by clicking on the **Use Input X Limit** check box. Then enter the value and time deadband for the limit (for more details see Section 6.5 of this manual).

Maintaining the Field Unit

The Field Unit is extremely easy to maintain because it requires no periodic calibration or system checks. The Field Unit has a self-diagnostic that is constantly checking the internal system. If any errors are found they are reported via the LCD, Base Radio, or the WIM software. A simple yearly visual inspection for the following is all that is needed:

- Is the Field Unit still securely fastened to the equipment being monitored?
- Are there any visible corrosions, cracks, or residue build-ups on the unit?
- Has anything about the application changed from the original intended use?

7.1: Changing the Battery

Warning

Explosions may result in death or serious injury. Do not remove the instrument cover or open wiring housing in explosive atmospheres when power and communications are on. Instead, remove the Field Unit from the hazardous location and then proceed to open the instrument cover and replace the battery.

Warning

The replacement battery **MUST** be a TADIRAN™ Lithium Inorganic Battery (non-rechargeable). Size C—3.6Volts, #TL2200/S. Use of a different battery will **VOID** the intrinsic safety rating of this device and may result in an explosion!

Warning

When removing the housing do not twist or bend the green flex cable! Doing so may cause the tether to improperly seat next to the antenna and greatly reduce operable RF distances. Do not allow the housing to flop around while hanging by the tether.

Caution

When replacing the battery, the positive end of the battery clip is the end with the red wire. Putting the battery in backwards will blow a fuse!

The battery will need to be changed within one month of seeing a ‘LOW BAT’ message on either the Field Unit or in WIM. This is a simple process:

1. Make sure you have the correct replacement battery:

AWS model # WI-BATTERY-Kit
 TADIRAN™ Lithium Inorganic Battery (non-rechargeable)
 Size “C” – 3.6Volts
 #TL2200/S
2. Power down the Field Unit by pressing and holding both the NEXT and ENTER buttons for a few seconds and then entering the password.
3. Remove the 4 set screws on the sides of the Field Unit housing with a standard screwdriver.
4. Remove the housing and locate the battery.
5. Remove the old battery and replace it with the new battery, positive end first. (Note that the positive end of the battery clip is the end with the red wire).
6. Replace the housing and screw the housing back on. Power up the unit by pressing and holding both the NEXT and ENTER buttons for a few seconds.
7. Properly dispose of the used battery.

Technical Specifications

Acoustic Transducer Characteristics

- Center Frequency: 40.0±3.0 kHz
- Bandwidth (-6 dB) 2.0kHz

Output Characteristics

- Amplitude is indicated by a display reading from 0 to 255.

RF Characteristics

- 902 MHz – 928 MHz Frequency Hopping Spread Spectrum, FCC certified ISM license-free band
- Up to 3000' range from Base Radio with clear line of sight;
- The RF module in each field unit is individually tested and calibrated over the full temperature range to ensure reliable wireless operation

Operating Temperature Range

- -40 °F to +185 °F (-40 °C to +85 °C) electronics
- -4 °F to +158 °F (-20 °C to +70 °C) display (full visibility)
- -40 °F to +185 °F (-40 °C to +85 °C) display (with reduced visibility)

Physical Characteristics

- Brass and Cast Aluminum Base
- Optional Stainless Steel and Baked Enamel Base
- GE Lexan® Cover. V-0 Rating and UV Stable

Operating Vibration and Shock Characteristics

- Certified per IEC EN00068 2-6 (vibration) and 2-27 (shock)

Random Vibration Characteristics

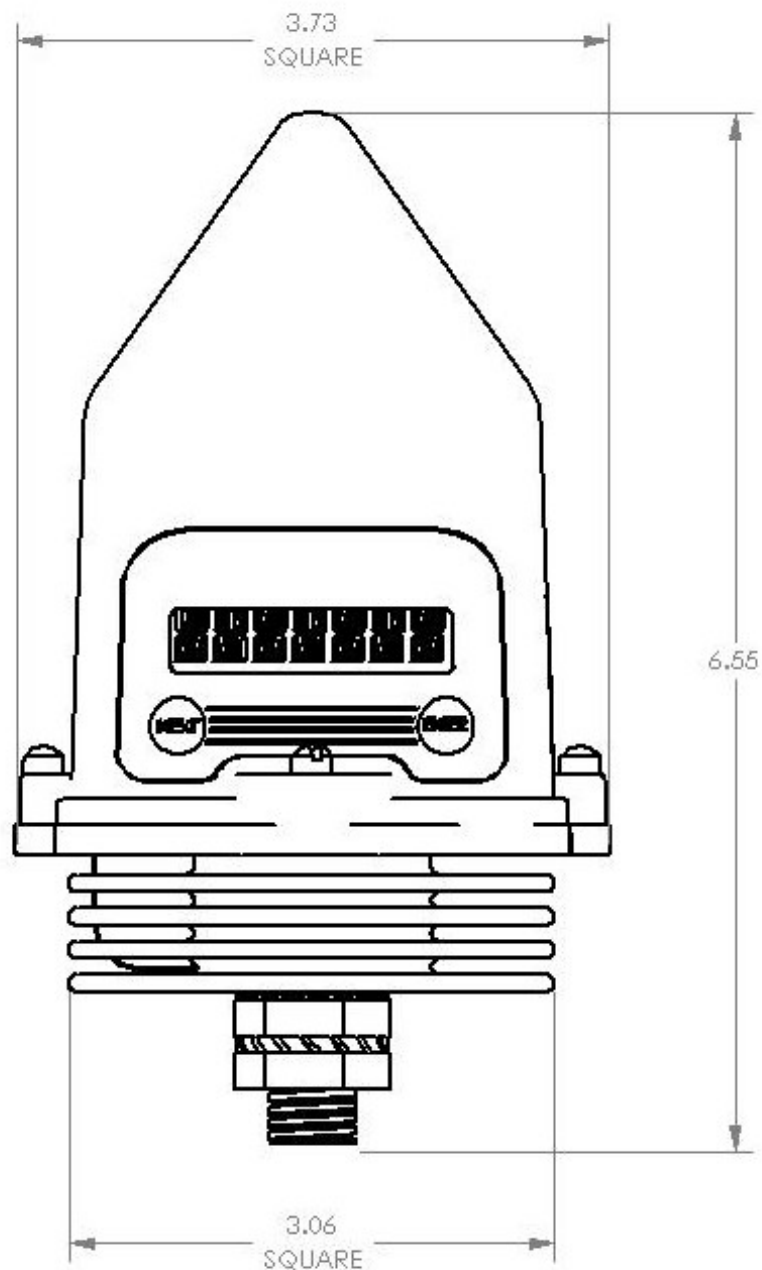
- Certified to withstand 6 g's, 15 minutes per Axis from 9 – 500 Hz

Electromagnetic Compatibility (CE Compliance)

- Operates within specification in fields from 80 to 1,000 MHz with Field strengths to 30 V/m. Meets EN 50082-1 general immunity standard and EN 55011 compatibility emissions standard

Industrial Certification

- Rated for industrial use -40 °F to 185 °F (-40 °C to 85 °C)
- FM NEMA 4 weather-proof housing
- FM rated intrinsically safe for Class I/II/III, Division 1, Groups A,B,C,D,E,F&G; Class I/II/III, Division 2, Groups A,B,C,D,F&G



Dimensioned Mechanical Drawing

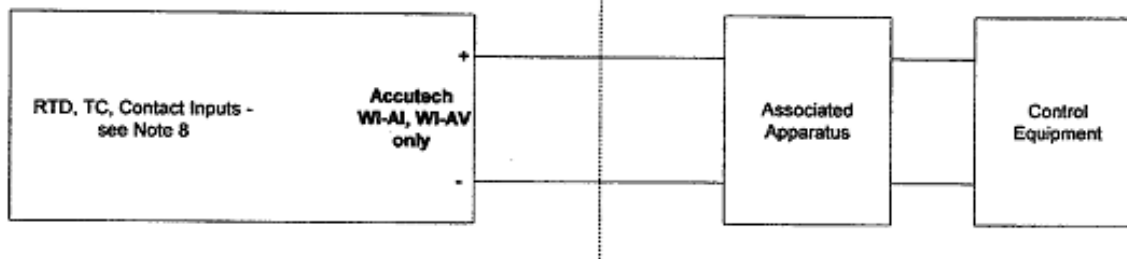
REV	ECO	Approved	Date	DESCRIPTION
A	PR-215	JC	10/24/03	
B	786	JC	08/31/04	Added Model Numbers
C	822	CL	4/11/05	Fixed Typo's in chart, Added WI-SI-S, WI-SI-N, WI-SI-NT
D	828	CL	9/12/05	Added Model Numbers (Reference 797 05-05)
E	878	RS	2/9/06	Added CSA information

FM APPROVED INTRINSICALLY SAFE INSTALLATION CONTROL DRAWING

HAZARDOUS (CLASSIFIED) LOCATION

Class I, Zone 0, Group IIC
 Class I, Division 1, Groups A, B, C, and D
 Class II, Division 1, Groups E, F, and G
 Class III

UNCLASSIFIED LOCATION



Accutech WI-AI, WI-AV Entity Parameters:

$U_i (V_{max}) = 30V$
 $I_i (I_{max}) = 100mA$
 $P_i = 0.9W$
 $C_i = 0$
 $L_i = 0$

Notes:

- The Intrinsic Safety Entity concept allows the interconnection of two FM Approved Intrinsically safe devices with entity parameters not specifically examined in combination as a system when:
 U_o or V_o or $V_t \leq V_{max}$, I_o or I_{sc} or $I_t \leq I_{max}$, C_a or $C_o \geq C_i + C_{cable}$, L_a or $L_o \geq L_i + L_{cable}$, $P_o \leq P_i$.
- Dust-tight conduit seal must be used when installed in Class II and Class III environments.
- Control equipment connected to the Associated Apparatus must not use or generate more than 250 Vrms or Vdc.
- Installation should be in accordance with ANSI/ISA RP12.6 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the National Electrical Code® (ANSI/NFPA 70) Sections 504 and 505.
- The configuration of associated Apparatus must be FM Approved under Entity Concept.
- Associated Apparatus manufacturer's installation drawing must be followed when installing this equipment.
- No revision to drawing without prior FM Approval.
- RTD, TC, and Contact Input process connections to a Simple Apparatus Only.
- Accutech WI-RT-S, CO-RT-S, WI-TC-S, WI-GP-S, WI-AP-S, WI-SI-S, WI-GL-S, WI-RT-M, CO-RT-M, WI-TC-M, WI-GP-M, WI-AP-M, WI-SI-M, WI-GL-M, WI-AM, SW-AM, WI-AP-I, WI-GP-I, WI-RT-I, and WI-TC-I MUST be installed to a bonded process.
- Accutech WI-AI, WI-AV has an internal ground screw mounted in the enclosure and must be connected to IS ground.
- All conduit connections must be sealed within 18" per NEMA 4 Standards for models WI-xx-N, WI-xx-NT, CO-xx-N and CO-xx-NT.

CERTIFICATION DOCUMENT – NO CHANGES PERMITTED WITHOUT PRIOR FM APPROVAL

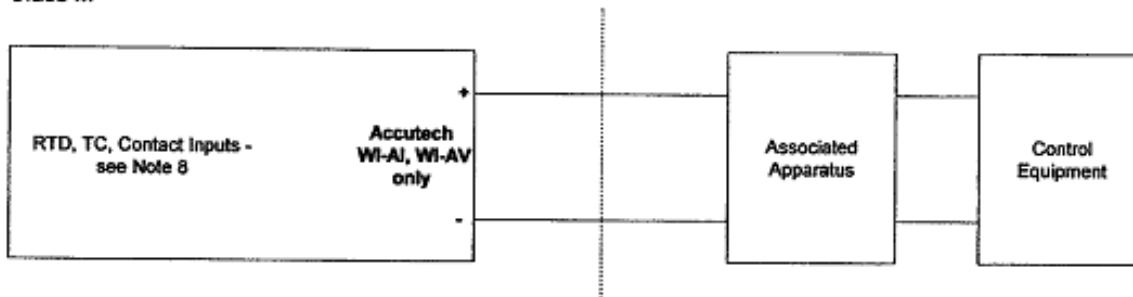
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	JC	10/24/03				
	Checked By:	Date:	TITLE: I/S Installation Control Drawing – Wireless Sensors			
	PCN	10/24/03				
	Released By:	Date:	Scale	Size	Drawing NO	Rev
	PCN	10/24/03	N/A	A	6023 520	E
						Sheet 1 of 4

CSA APPROVED INTRINSICALLY SAFE INSTALLATION CONTROL DRAWING

HAZARDOUS (CLASSIFIED) LOCATION

Class I, Zone 0, Group IIC
 Class I, Division 1, Groups A, B, C, and D
 Class II, Division 1, Groups E, F, and G
 Class III

UNCLASSIFIED LOCATION



Accutech WI-AI, WI-AV Entity Parameters:

$U_i (V_{max}) = 30V$
 $I_i (I_{max}) = 100mA$
 $P_i = 0.9W$
 $C_i = 0$
 $L_i = 0$

Notes:

- The Intrinsic Safety Entity concept allows the interconnection of a CSA Certified Associated Apparatus to a CSA Certified Intrinsically Safe field device, each with entity parameters not specifically examined in combination as a system when: V_{oc} or $U_o \leq V_{max}$ or U_i , I_{sc} or $I_o \leq I_{max}$ or I_i , C_a or $C_o \geq C_i + C_{cable}$, L_a or $L_o \geq L_i + L_{cable}$, $P_o \leq P_i$. Where two separate barrier channels are required, one dual-channel or two single-channel barriers may be used, where in either case, both channels have been Certified for use together with combined entity parameters that meet the above equations.
- Dust-tight conduit seal must be used when installed in Class II and Class III environments.
- Control equipment connected to the Associated Apparatus must not use or generate more than 250 Vrms or Vdc.
- Installation should be in accordance with the Canadian Electrical Code, Part 1, Section 18.
- The configuration of associated Apparatus must be CSA Certified under the Entity Concept.
- Associated Apparatus manufacturer's installation drawing must be followed when installing this equipment.
- No revision to drawing without prior CSA Approval.
- Accutech WI-RT-S, CO-RT-S, WI-TC-S, WI-GP-S, WI-AP-S, WI-SI-S, WI-GL-S, WI-RT-M, CO-RT-M, WI-TC-M, WI-GP-M, WI-AP-M, WI-SI-M, WI-GL-M, WI-AM, SW-AM, WI-AP-I, WI-GP-I, WI-RT-I, and WI-TC-I MUST be installed to a bonded (grounded) process.
- Accutech WI-AI, WI-AV has an internal ground screw mounted in the enclosure and must be connected to IS ground.

Division 2 Warning Statement:

WARNING: EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON- HAZARDOUS

Division 1, Division 2, Zone 0 Warning Statement:

WARNING: EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR USE IN A HAZARDOUS LOCATION.

CERTIFICATION DOCUMENT – NO CHANGES PERMITTED WITHOUT PRIOR CSA APPROVAL

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	N/A	N/A	TITLE: I/S Installation Control Drawing – Wireless Sensors					
	N/A	N/A	Scale	Size	Drawing NO	Rev	Sheet	
	N/A	N/A	N/A	A	6023 520	E	2 of 4	

MODEL	SENSOR CONNECTIONS						INPUT CONNECTIONS			
WI-AM, SW-AM (Acoustic Monitor)	Integral Sensor – no external connections						Integral Sensor – no external connections			
WI-GP-I, WI-AP-I WI-GL-I (Pressure Sensor)	Integral Sensor – no external connections						Integral Sensor – no external connections			
WI-RT-I (RTD Temperature)	Integral Sensor – no external connections						Integral Sensor – no external connections			
WI-TC-I (T/C Temperature)	Integral Sensor – no external connections						Integral Sensor – no external connections			
	J1 (Terminal Board) Sensor Input						J3 (Terminal Board) Input Switches			
	1 (CH1+)	2 (CH1-)	3 (EXC+)	4 (EXC-)	5 (CH2+)	6 (CH2-)	1 (ISW1+)	2 (ISW1-)	3 (ISW2+)	4 (ISW2-)
WI-RT-S, WI-RT-M CO-RT-S, CO-RT-E CO-RT-M WI-RT-E, WI-RT-EL (RTD Temperature)	RTD+	RTD-	EXC+	EXC-			Input SW1+	Input Sw1-		
WI-GP-S, WI-AP-S WI-GP-M, WI-AP-M WI-GL-M, WI-GL-S WI-GP-E, WI-AP-E WI-GL-E, WI-DP-E WI-GP-EL, WI-AP-EL WI-GL-EL, WI-DP-EL (Pressure Sensor)	Pressure Out+	Pressure Out-	EXC+	EXC-	Bridge V+	Bridge V-	Input SW1+	Input Sw1-		
WI-TC-S, WI-TC-E WI-TC-M, WI-TC-EL (T/C Temperature)	T/C 1+	T/C 1-			T/C 2+	T/C 2-	Input SW1+	Input Sw1-	Input SW2+	Input SW2-
WI-AI, WI-AI-M (Dual 4/20mA)	4/20mA CH1+	4/20mA CH1-			4/20mA CH2+	4/20mA CH2-	Input SW1+	Input Sw1-	Input SW2+	Input SW2-
WI-AV, WI-AV-M (Dual 0-10V)	0-10V CH1+	0-10V CH1-			0-10V CH2+	0-10V CH2-	Input SW1+	Input Sw1-	Input SW2+	Input SW2-
WI-SI-S, WI-SI-M WI-SI-E, WI-SI-EL (Dual Switch Input)							Input SW1+	Input Sw1-	Input SW2+	Input SW2-

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IS Installation Control Drawing – Wireless Sensors

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	Twisted Pair 1		Twisted Pair 3				Twisted Pair 2			
WI-RT-N, WI-RT-NT WI-RT-NT-yy-z (RTD Temperature)	RED SIG1+	BLK SIG1-	RED EXC+	BLK EXC-			RED ISW1+	BLK ISW1-		
	Twisted Pair 1		Twisted Pair 3		Twisted Pair 4		Twisted Pair 2			
WI-GP-N, WI-AP-N WI-GP-NT, WI-AP-NT WI-GP-NT-yy-z WI-AP-NT-yy-z (Pressure Sensor)	RED PRES OUT+	BLK PRES OUT-	RED EXC+	BLK EXC-	RED SENSE +	BLK SENSE -	RED ISW1+	BLK ISW1-		
	Twisted Pair 1				Twisted Pair 4		Twisted Pair 2		Twisted Pair 3	
WI-TC-N, WI-TC-NT WI-TC-NT-yy-z (T/C Temperature)	BLK SIG1+	RED SIG1-			BLK SIG2+	RED SIG2-	RED ISW1+	BLK ISW1-	RED ISW2+	BLK ISW2-
	Twisted Pair 1				Twisted Pair 4		Twisted Pair 2		Twisted Pair 3	
WI-AI-N WI-AV-N WI-AI-NT WI-AV-NT WI-AI-NT-yy-z, WI-AV-NT-yy-z (Dual 4/20mA)/(Dual 0-10V)	RED SIG1+	BLK SIG1-			RED SIG2+	BLK SIG2-	RED ISW1+	BLK ISW1-	RED ISW2+	BLK ISW2-
	Twisted Pair 1									
CO-RT-N, CO-RT-NT CO-RT-NT-yy-z (Resistance Tape)	BLK SIG1+	RED SIG1-								
	Twisted Pair 1		Twisted Pair 3		Twisted Pair 2					
WI-GP-S-xxHAL WI-AP-S-xxHAL (Pressure Sensor)	RED PRES OUT+	BLK PRES OUT-	RED EXC+	BLK EXC-	RED SENSE+	BLK SENSE-				
							Twisted Pair 1		Twisted Pair 2	
WI-SI-N, WI-SI-NT WI-SI-NT-yy-z (Dual Switch Input)							RED ISW1+	BLK ISW1-	RED ISW2+	BLK ISW2-

yy = Y6,Y9 z = Antenna cable length, max length 100 ft with bonded ground.

NOTE: Devices connected to J3 and input wires must be of "Simple Apparatus" type.

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TITLE:

US Installation Control Drawing – Wireless Sensors

Scale

Size

Drawing NO

6023 520

Rev

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Navigating User Menus

Pressing either the NEXT or ENTER buttons located on the front of the Field Unit or Base Radio just below the Liquid Crystal Display (LCD) screen is all that is needed to navigate the respective menus. Pressing both of these buttons for one second will turn the unit on.

Pressing the NEXT button at any time while the Field Unit is cycling through the normal messages causes the Field Unit to enter the setup mode. The NEXT button is then used to step through menu options, and the ENTER button is used to enter a sub menu of what is displayed on the LCD at that time. If no button is pressed within a 30 second period the unit goes back to the normal display mode.

If you enter a sub menu that requires a numerical input, such as 001, the left most 0 will be blinking. This indicates that pressing the NEXT button will increment this value with each press from 0 to 9 and back to 0 again. Pressing the ENTER button will move to the next available value. If the last value is blinking, pressing ENTER will save the entered values and return from the sub menu.

If both the NEXT and ENTER buttons are depressed at once, a message on the LCD displaying OFF? will appear. If both buttons are released upon appearance of this message the user will be returned to the scrolling main screen. If both buttons are not released for the duration of the OFF? message the unit will power down and turn off. Note: If the unit is turned off while entering values in a sub menu, those values will NOT be saved.

* As shown throughout the document, this mark indicates that these menu options will automatically turn off if the Wireless Instrumentation Manager Software is used. All changes to these Field Unit menu options should be made through software instead. This is to prevent simultaneous changes from taking place. If you wish to discontinue use of the software and want these menus re-instated, you must contact your Adaptive Wireless Solutions Sales Representative.

Field Unit Displayed Message Definitions

This section covers the various messages, displayed on the Field Unit LCD, that occur during operation of the device.

Operations Sequence

- **RF Link Status**
 - ⇒ RF OK—Field Unit and Base Radio are communicating properly
 - ⇒ RF SYNC—Field Unit and Base Radio are attempting to synchronize communications.
 - ⇒ RF OFF—Field Unit's RF Channel is set to RF OFF
 - ⇒ NO RF—Field Unit and Base Radio have no communications
- **Input Level**
 - ⇒ XXX.XX—Currently measured Ultrasound Input level
 - ⇒ XX.XX°C—Currently measured Temperature Input level

Error Messages

If an error is detected with the operation of the Field Unit a message will be displayed on the Field Unit LCD (a corresponding message may also appear on the Base Radio LCD).

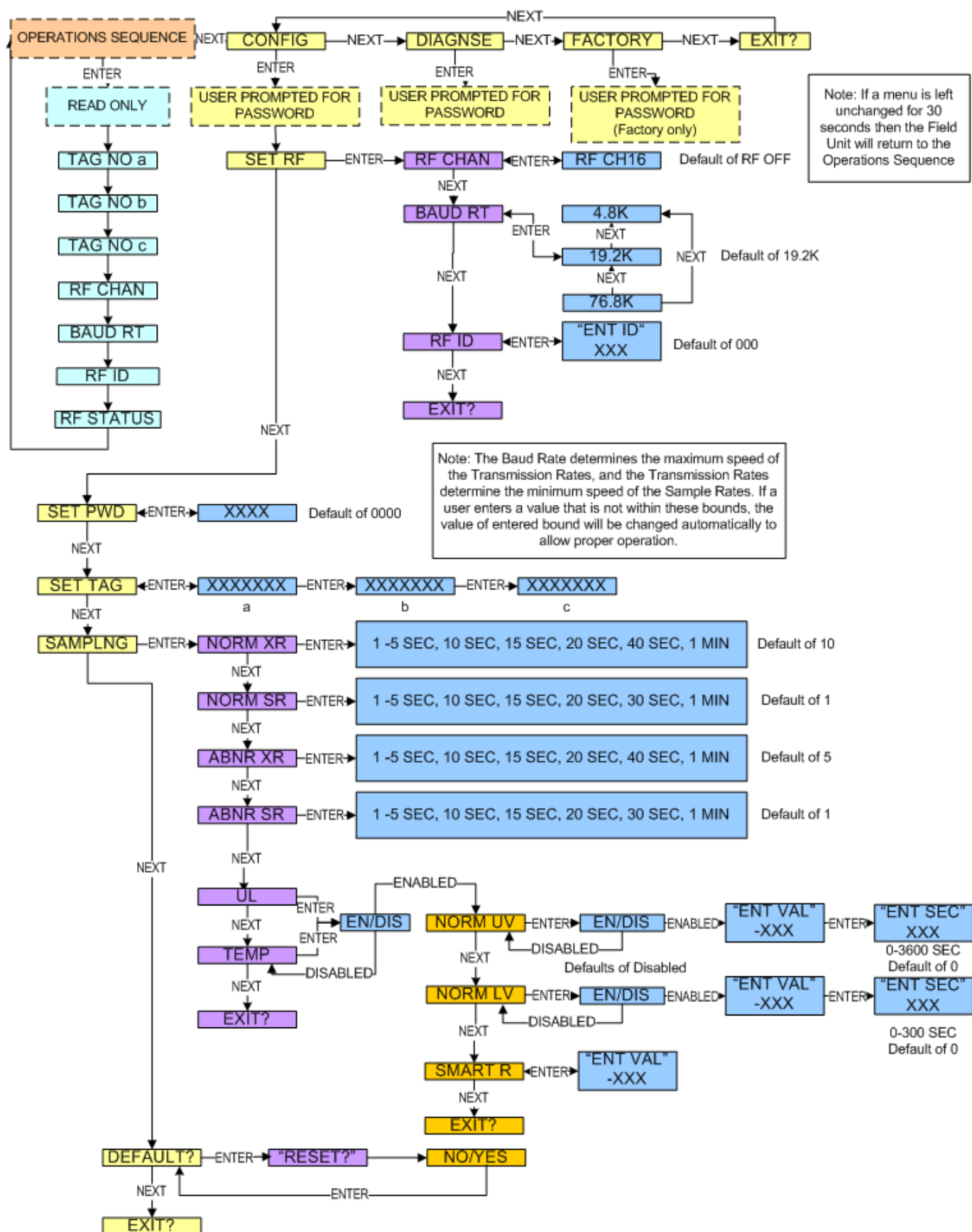
There are few types of error messages, warning and fatal. Warning messages are displayed as part of the normal cycling message sequence. These are:

- **LOW BAT**—battery should be replaced as soon as possible
- **NO RF**—can not detect Base Radio
- **S FAULT**—there is an open sensor or excitation wire detected. Also if a sensor value goes above/below logical limits. The unit will display 9999.99 for measurement (sensor fault mode); but will continue sampling and recover if the problem desists.
- **OVERRNG**—the device is measuring a value above/below sensor dependent bound values. For example the Analog Input device will report over-range if measurement is above 100% range of the Analog Input sensor. If the measurement goes above 150% full range, the unit will go into Sensor Fault mode. In over-range mode, the measurement is continually displayed, with the "OVERRNG" message to remind the user that the specified range of the sensor and the calibrated range of the device is being exceeded.

Fatal error messages will replace the normal cycling message sequence and will flash. A fatal message indicates the Field Unit is no longer operating normally and requires repair. These are:

- RF ERR —fatal error within RF communications
- SEN ERR —fatal error within the sensor electronics
- SYS ERR —fatal error within the microprocessor system
- RF CAL —fatal error within the RF calibration system

Field Unit Menu Map





A B O U T U S

Adaptive Wireless Solutions develops, produces and supports partner specific, high value industrial measurement and process solutions that enable our end users to increase efficiency, through-put and environmental compliance.

AWS customers include large national companies in the oil and gas, chemicals, pharmaceutical, food and beverage, primary materials processing, and energy industries. In addition to the wireless product line, AWS also offers a traditional wired line of temperature, pressure and differential pressure instrumentation.

In the process control field, where quality is taken for granted and new technology is announced daily, we have deliberately concentrated our efforts on the development of instrumentation that makes business sense. The result is a product range that is rugged, secure, and reliable and works in even the most hazardous environments. We give companies the tools to reduce costs, save time, enhance safety, improve environmental performance and cut waste.

The next industrial revolution is right now. Let AWS show you how to realize gains in operating efficiency.

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Adaptive Wireless Solutions Inc
577 Main St
Hudson, Ma 01749

Phone: (978) 875-6000
Fax: (978) 568-9085

www.adaptive-wireless.com